



Systems Approaches in Immunology:

*Advances and challenges in
multi-scale modeling*

January 10-11, 2010

<http://cnls.lanl.gov/immunology>

In the last several decades, immunology has grown from a science of antibodies to an entire field of research dealing with molecular, cellular, population and organismal details of immunological processes in mammals. Our understanding of how immune systems control growth of infectious diseases has increased dramatically due to the development of molecular biology techniques and in-vivo imaging of T and B cell responses. These new techniques have led to vast amounts of data being generated for which there is an increasing number of studies applying methods of mathematical modeling aimed at analyzing these data to gain a deeper understanding of immunological processes. However, most of the experimental and theoretical work to date has focused on questions generally concerning only one level of organization - for example, on understanding signal processing in cells or population dynamics of T cell responses to viruses. Advancements in immunology can be made through the development of theoretical and experimental techniques supplying models that bring together phenomena at different levels of complexity to study mechanisms that arise at the systems level.

This meeting will bring together scientists involved in studying immunological processes at the cellular, population, and organismal levels, both experimentally and theoretically, with the intention to discuss the ways data and analyses can be combined across these various levels of complexity to form a basis of systems immunology. We plan to involve scientists with expertise in experimental immunology and those with expertise in mathematical modeling in immunology.

The major goals of the meeting will be to:

- * Discuss recent advances in understanding immunological processes occurring at intracellular, cellular, and population levels in mice and humans.
- * Present different approaches in modeling immunological processes at intracellular, cellular, population, and organismal levels and share new insights that such modeling approaches may deliver.
- * Identify and promote further areas for collaborative research between the groups involved in this area of biology.

Speakers:

Bali Pulendran
(Emory)

Aaron Dinner
(U Chicago)

Phil Hodgkin
(WEHI, AU)

Michael Meyer-Hermann
(Frankfurt, GE)

Mark Shlomchik
(Yale)

Martin
Meier-Schellersheim
(NIH)

Arup Chakraborty
(MIT)

Miles Davenport
(UNSW, AU)

Thorsten Mempel
(Harvard)

Jurgen Westermann
(Luebeck, GE)

Rustom Antia
(Emory)

Organizers:

Vitaly V. Ganusov
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